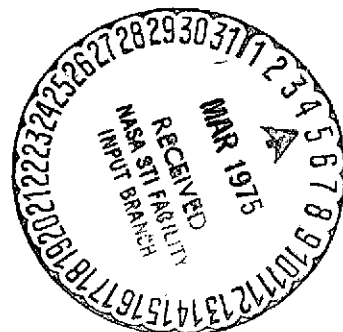


A SCIENTIFIC CONFERENCE ON THE PROBLEM,
"HYPOXIA DURING PATHOLOGICAL PROCESSES CAUSED BY EXTREME
FACTORS", DEVOTED TO THE 80TH BIRTHDAY OF ACADEMICIAN
OF THE ACADEMY OF MEDICAL SCIENCES OF THE USSR,
I. R. PETROV

Ye.V. Gubler, N.V. Korostovtseva, V.K. Kulagin,
and B.R. Yaremenko

Translation of "Nauchnaya konferentsiya po voprosu 'gipoksiya pri patologicheskikh protsessakh vyzvannykh ekstremal'nymi vozdeystiyami", posvyashchennaya 80-letiyu so dnya pozhdeniya akad. AMN SSSR, I. R. Petrova", Patologicheskaya fiziologiya i eksperimental'naya terapiya, No. 5, Sept.-Oct. 1974, pp. 92-94.



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16. Abstract A description is given of a scientific conference held on October 23 1973 in Leningrad on the topic of hypoxia during pathological processes. The conference was divided into four sessions, and the subjects of each session are itemized and discussed.			
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On 22 and 23 October 1973, organized by the S. M. Kirov Military-Medical Academy, the Leningrad Scientific Research Institute of Hematology and Blood Transfusion, and the Leningrad branch of the All-Union Scientific Society of Pathophysiolgists, a conference was held in the city of Leningrad. At the two plenary and four sectional sessions, 47 reports were given and 151 reports were published in the published collection of abstracts.** More than 200 delegates from 21 cities of the USSR participated in the conference.

The report of A. M. Chernukh, I. I. Kochetygov and V. B. Lemus was devoted to the vital and creative path of I. R. Petrov. The report of Ye. V. Gubler, I. V. Vasil'yev, Ye. A. Kovalenko, and I. V. Korostovtseva pertaining to the investigations of I. R. Petrov and his students on the problem of oxygen starvation (OS) noted

* Numbers in margin indicate pagination in original foreign text.

** Gipoksiya pri patologicheskikh protsessakh, vyzvannykh ekstremal'nymi vozdeystviyami. Tezisy dokladov na konferentsii. (Hypoxia During Pathological Processes Caused by Extreme Factors. Abstracts of Reports Given at a Conference). Leningrad, 1973.

that I. R. Petrov created the modern classification of OS and the regulatory reactions during oxygen starvation; I. R. Petrov and his students also developed many experimental models of oxygen starvation, investigated changes in the nervous system, endocrine glands and the system of carbohydrate and energetic metabolism during OS in detail, created the modern concepts concerning the role of protective inhibition, its biochemical basis and two-fold significance in the pathogenesis of OS, as well as methods of using it for therapeutic and prophylactic goals (narcotic and neuroplegic substances, artificial hypothermia). The students of I. R. Petrov conducted a detailed study of the basic pathogenic factor of OS — a decrease in pO_2 in the tissues of the brain, heart, and other organs when breathing various atmospheres during slowly and rapidly developing OS, simulating possible emergency situations during air and spaceflights, the effect of g-forces and long-term hypokinesis, acute blood loss and its treatment, traumatic and burn shock, and developed methods of increasing resistance to OS, and to a significant degree clarified the mechanisms of increasing resistance. I. R. Petrov and his students suggested a classification of antihypoxic means and studied the effect of many of them; they developed a system of combination treatment of OS and its individual forms that are widely employed in practice. I. R. Petrov's blood-replacing fluid proved to be the most widely used blood-replacing substance at the end of World War II, since it is an effective means of treating blood loss.

The investigations of I. R. Petrov and his students with respect to shock and blood loss were the subject of a report by V. K. Kulagin, A. A. Zor'kin, G. Sh. Vasadze, I. D. Kudrin and L. Ye. Rakhman. The report noted that basic concepts of the neurogenic theory of the pathogenesis of shock and blood loss were formulated, based on these investigations. I. R. Petrov and his associates attached the necessary significance to the role of direct factors in the pathogenesis of shock (local blood and

plasma loss, lipid embolism, the effect of biologically active products from the wound, limitation of function of the injured organs), emphasizing, however, that shock can never be attributed merely to these symptoms, since the disorders and functions of the organism mediated through the nervous and endocrine systems determine the specifics, and frequently, the severity of the process. The neural mechanisms also play an important role in simple blood loss.

The significance of the studies of I. R. Petrov in developing the problem of the biological effect of nonionizing radiation was the subject of a report by V. M. Savin, Ye. A. Yermolayev, A. G. Subbota, B. A. Chukhlovin, V. A. Syngayevskaya, and A. M. Semenov. The investigation of I. R. Petrov in developing the problems of irreversibility during shock and blood loss was the subject of a report by V. A. Negovskiy.

Reports on a number of general problems of OS were given by N. N. Sirotinin ("The Interrelationship of Hypoxemic and Circulatory Hypoxia"), A. N. Filatov ("Blood Replacing Substances in the Treatment of Shock and Blood Loss"), Ya. G. Uzhanskiy ("The Pathogenesis of Acute Hypoxia According to the Data of Erythron Study"), and A. I. Barbashova ("The Classification of Reactions of the Organism to the Prolonged Effect of Certain Unfavorable Environmental Factors").

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Subjects of discussion at the sections' sessions were problems of the pathogenesis, prophylaxis, and treatment of shock, blood loss, and a number of other pathological processes as symptoms of OS.

The number of modern characteristics in the development of the problem of OS were reflected.

A significant number of the joint reports were presented by collectives of specialists from various laboratories and even different cities, which indicates the effectiveness of combined investigations of OS carried out according to coordinated plans and using single experimental models (G. I. Mchedlishvili, M. L. Garfunkel', et al., V. K. Kulagin, B. A. Saakov, A. A. Zor'kin, G. Sh. Vasadze, I. D. Kudrin, L. Ye. Rakhman, et al.).

In studying common mechanisms of hypoxia characteristic of its many types, morphological investigations have undergone significant development, primarily distinguished by attention to the subcellular level of integration of the organism, investigated on the basis of employing electron microscopic methods, and second, a study of the relationship of metabolic processes with structural changes in the cells (B. A. Saakov, et al., Ye. F. Lunets, et al., A. M. Gurvich, et al.).

Metabolic changes during hypoxia were investigated in many studies. In a number of them, as in previous years, a great deal of attention was paid to studying the energetic metabolism (L. T. Lysyy and V. Z. Burlaku, N. V. Korostovtseva, et al., N. V. Yakovlev, et al.). N. I. Kochetygov emphasized the relationship of disorders of the water-electrolyte balance (whose maintenance is an energy-consuming process) with the energetic deficiency caused by hypoxia.

Metabolic acidosis most often served as the universal criterion of the presence and severity of tissue hypoxia.

The study of the oxygen homeostasis of the organism underwent significant development based on polarographic methods (tension and absorption of oxygen at different levels of delivery from the alveolar level to the mitochondrial). Many constants of this homeostasis were obtained and the dynamics of changes

characteristic for the norm and for a number of pathological processes were studied (Ye. A. Kovalenko, A. V. Ryazhskiy, M. N. Maslova, A. Ye. Gromov, E. S. Mailyai, et al.).

Processes of regulation during hypoxia, examined from the viewpoint of the general theory of control, analysis of the inverse relationships and regulatory pathways were discussed in a number of reports (Ye. V. Gubler, G. Sh. Vasadez, Ya. G. Uzhanskii, et al.). The evolution of processes of regulation were examined with respect to the ancient geological periods of the Earth's development, when oxygen was scarce and anaerobic mechanisms of energy liberation in biological systems predominated (N. N. Sirotinin, Ye. A. Kovalenko).

Notwithstanding the high sensitivity of nerve tissue to oxygen deficiency, a relatively high stability of brain function was revealed and attributed to maintenance of microcirculation in the brain (S. M. Vashetina and G. S. Mazurkevich), probably due to certain special vascular regulator mechanisms (G. I. Mchedlishvili and M. L. Garfunkel'). A. V. Volkov, having calculated the contribution of ischemization of different organs and tissues to processes causing the unfavorable outcome of revival according to the coefficient of regression, established that ischemia of the region of the abdominal aorta, liver, muscles, and skin, plays a greater role than was earlier considered in this development.

Most reports were devoted to analyzing the role and characteristics of hypoxia during individual pathological processes; emotio-genic hypoxia was described (G. I. Gurevich, V. K. Martens), as were hypoxia during prolonged sea voyages (I. A. Sapov and A. F. Solodkov), and hypoxia in the erectile phase of traumatic shock (B. R. Yaremenko, et al.).

New data on the application of antihypoxic medications were presented at the conference — gutimin (A. Ye. Aleksandrova), cytochrome C (L. G. Bogomolova, et al., V. A. Strukov), pabofen (V. I. Generalov), hexosophosphate (Z. A. Chaplygina and G. A. Baskoivch), and others, and on the study of the effect of an altered atmosphere on the course of hypoxia, specifically carbon dioxide (M. P. Brestkin and P. M. Gramenitskiy, P. V. Vasil'lev and V. B. Malkin, V. P. Zagryadskiy, and Z. K. Sulimo-Samuylo), and on characteristics of the adaptive reactions during different methods of adaptation to hypoxia (M. A. Agadzhanyan, et al., V. A. Berezovskiy, Ye. A. Kovalenko, et al., V. D. Lindenbraten, et al., and others). The report of M. V. Korostovtseva, V. I. Bayev, et al., presented principally new material characterizing the specifics of metabolic changes during increased resistance to OS, achievable by means of preliminary repeated cooling under conditions of increasing hypercapnia and hypoxemia. Qualitative differences between the adaptive changes that appear during this process and those occurring during adaptation achieved by conditioning to hypoxia are isolated: The low energetic value of the glycolytic pathway of converting hydrocarbons, the increase in intensity of aerobic processes on the whole, and specifically, the increase in oxidation of the ketone bodies and changes in the protein metabolism were found. Also described were changes in the condition of this restructuring of the GGPS system (V. I. Bertash, Ye. S. Sergeyeva), and the thyroid gland (A. I. Pizen).

A number of reports examined the criteria of the presence and the severity of hypoxia and methods of its early identification and prediction. B. A. Saakov emphasizes the expediency of employing the theory of probabilities and the theory of information for 794 selecting informative signs distinguishing among the different forms of OS. On the basis of analyzing the processes of "emergency" regulation during hypoxia, Ye. V. Gubler considers that it is not the degree of inversion of perimeters to the norm but the dynamics

of predicting indices calculated according to the results of the integral estimate of signs that serve as the criterion of the effectiveness of antihypoxic means. In the capacity of prognostically informative signs of different forms of hypoxia, such already classical ones as the base deficit and concentration of hydrogen ions in the blood, the blood content of lactic and pyruvic acids are suggested. (V. A. Maksimets, I. G. Boldina, O. S. Nasonkin, B. I. Krivoruchko, and K. I. Sukhova, and others), as well as changes in the EEG and ECCOG, hyperfermentemia, (N. V. Kudrin, N. A. Kulikova, Ye. S. Bitjukova), change in the enzymatic formula of the leucocytes (N. A. Minina and R. B. Tsynkalovsky), cessation of the increment in the arterio-venous oxygen differential and a decrease in pulse scatter (Ya. A. Belen'kiy and D. M. Sagrman), and a number of others.

In the resolution accepted at the conference, the delegates noted that the results of work of the conference indicate the expediency of systematically conducting conferences on the problem "Hypoxia, its Pathogenesis, Prevention, and Treatment", and of a more extensive organization of the combination study of OS and its aftereffects by representatives of different specialties.

The resolution also noted the most promising trends in investigations in the field of oxygen starvation.

I. A section of general mechanisms of hypoxia characteristic of all of its forms:

1) A study of the metabolic processes, specifically, tension and absorption of oxygen at different levels of delivery — from the alveolar air to the mitochondria of the cells, the energetic metabolism, the water-electrolyte balance, and other types of metabolism;

2) A study of the relationship of processes of metabolism with structural changes in the organism — beginning with the organs and ending with the ultrastructural changes in the cells;

3) A study of changes in functional capacity and behavior during hypoxia.

II. A section for studying the antihypoxic means:

1) Studying different methods and regimes of adaptation to hypoxia and their therapeutic-preventative effect during the different pathological processes;

2) Developing antihypoxic means and combinations insuring an improvement in the delivery of oxygen to tissues, a decrease in oxygen consumption, and normalization of the oxidative processes;

3) A study of the effect of hypoxia on reactivity with respect to drugs.

III. A section for developing methods of early diagnosis of hypoxia, controlling its severity, and predicting its course and outcome:

1) Research for diagnostic and predictive informative signs of hypoxia and methods of their integral estimation, with the application of modern probability-statistical methods;

2) Studying the presence and degree of hypoxia during different pathological processes.

IV. A section of methods and techniques of experimentally
studying oxygen starvation:

1) A comparative study of hypoxia on different animals and man and the development of theoretical foundations of transferring the experimental data to man;

2) The development of uniform criteria of the severity of different forms of hypoxia and adopting them in practical investigations conducted by different collectives.

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